BENCHTOP INSTRUMENT

4 1/2 Digits
Bench Digital Multimeter
Operation Manual V2.0

CE

1. GENERAL

This bench type digital multimeter is a steady performance, 4 1/2 digital multimeter. It uses the LCD with 23mm-high figure to make the reading clear and make operation more convenient. A 30mm size LCD with backlight display makes the reading clear and make operation more convenient.

This instrument has the function of measuring DC and AC voltage, DC and AC current, Resistance, Capacitance, Hz, hFE, Diodes and Continuity. For AC measuring, it is performed by high accuracy true rms, has the feature of wide bandwidth measuring and to get accurate rms for AC flow of any waveform or AC+DC.

This instrument adopts double integral A/D converter as its core. It is an ideal tool for labs, factories and radio-technology.

2. WARNING

The instrument is designed according to IEC1010 standard (safety standard issued by International Electro technical Committee). Please read the following before operation:

- Do not input a value beyond the limited ones when measuring each range.
- The voltage less than 36V is the safe voltage. Please check the connection and insulation of test leads to avoid electric shock when measure the voltage higher than DC36V and AV25V.
- The test leads should be far away the test points when change the function and range.
- Select correct function and range to avoid fault operation.
- Please don't input voltage value when measuring resistance.
- The test leads should be far away the test points and turn off the power when change the fuse.
- Introduction for safety symbol:

exists high voltage; GND dual insulation must refer to manual.

3. SPECIFIFACTION

3-1. GENERAL SPECIFICATION

Display: LCD
Max. display: 19999 (4 1/2) digit large LCD with back light and auto polarity display
Measuring method: double integral A/D converter;
Sampleing rate: approx. 3 times/sec;
Over range display: "1";
Working environment: (0~40)℃, R.H<80% ;
Power supply: DC 220V/ 110V, 50/60Hz;
Dimension: 260mm×220mm×82mm.
Weight: approx.2kgs;
Accessories: manual, test leads, power cord, box.

3-2. TECHNICAL SPECIFICATION

3-2-1. Accuracy; ±(reading % + the lowest effective digit), temperature for accuracy guarantee (23±5)℃, R.H<80%, one year guaranteed from the production date.

3-2-2. Technical data

DC voltage (DCV)

Range	Accuracy	Resolution
200mV	±(0.05%reading+3)	10uV
2V		100uV
20V		1mV
200V		10mV
1000V	±(0.1%reading+5)	100mV

Input impedance: 10MΩ for all ranges;

Overload protection: 200mV range: 250VDC or AC peak value. Other range: 1000V DC or AC peak value.

AC voltage (ACV)

Range	Input frequency	Accuracy	Resolution
200mV	50Hz–50kHz	±(0.8%reading+80)	10uV
2V	50Hz–20kHz		100uV
20V			1mV
200V	50Hz–5kHz		10mV
750V	50Hz–400Hz	±(1.0%reading+50)	100mV

The input value for accuracy guarantee should be larger than 10% of full range.

Input impedance: 2MΩ for all ranges.

Overload protection：200mV range: 250V DC or AC peak value, other range: 1000V DC or AC peak value.

DC current (DCA)

Range	Accuracy	Resolution
20mA	±(0.35%reading+10)	1uA
200mA		10uA
2A	±(0.8%reading+10)	100uA
20A		1mA

Max. input voltage drop: 200mV

Max. input current: 20A（within 10s）

Overload protection: 2A/250V fuse，13A/250V fuse

AC current (ACA)

Range	Input frequency	Accuracy	Resolution
200mA	50Hz–5kHz	±(0.8%reading+80)	10uA
2A	50Hz–400Hz	±(1.0%reading+50)	100uA
20A			1mA

Max. input voltage drop: 200mV

Max. input current: 20A（within 10s）

Overload protection: 2A/250V fuse，13A/250V fuse

Resistance (Ω）

Range	Accuracy	Resolution
200Ω	±(0.1%reading+20)	0.01Ω
2kΩ	±(0.1%reading+5)	0.1Ω
20kΩ		1Ω
200kΩ		10Ω
2MΩ		100Ω
20MΩ	±(0.5%reading+5)	1kΩ

Open circuit voltage: less than 3V
Over load protection: 250V DC or AC peak value;

NOTE: At range 200 Ω, short-circuit the test leads to measure the wire resistance and then subtracts it from the real measurement.

Capacitance (C)

Range	Accuracy	Resolution
20nF	±(3.5%+20)	1pF
2uF		100pF
200uF	±(5%+30)	10nF

Measuring frequency: approx. 400Hz
Measuring voltage: approx. 40mV,
Overload protection: 36V DC or AC peak value

Frequency (FREQ.)

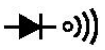
Range	Accuracy	Resolution
20kHz	±(1.0%reading+20)	1Hz
200kHz		10Hz

Input sensitivity: 500mV rms
Overload protection: 250V DC or AC peak value（within 15s）

hFE measuring

Range	Displaying	Test condition
hFE NPN or PNP	0～1000.0	Base current is approx. 10μA，Vce is approx. 3V.

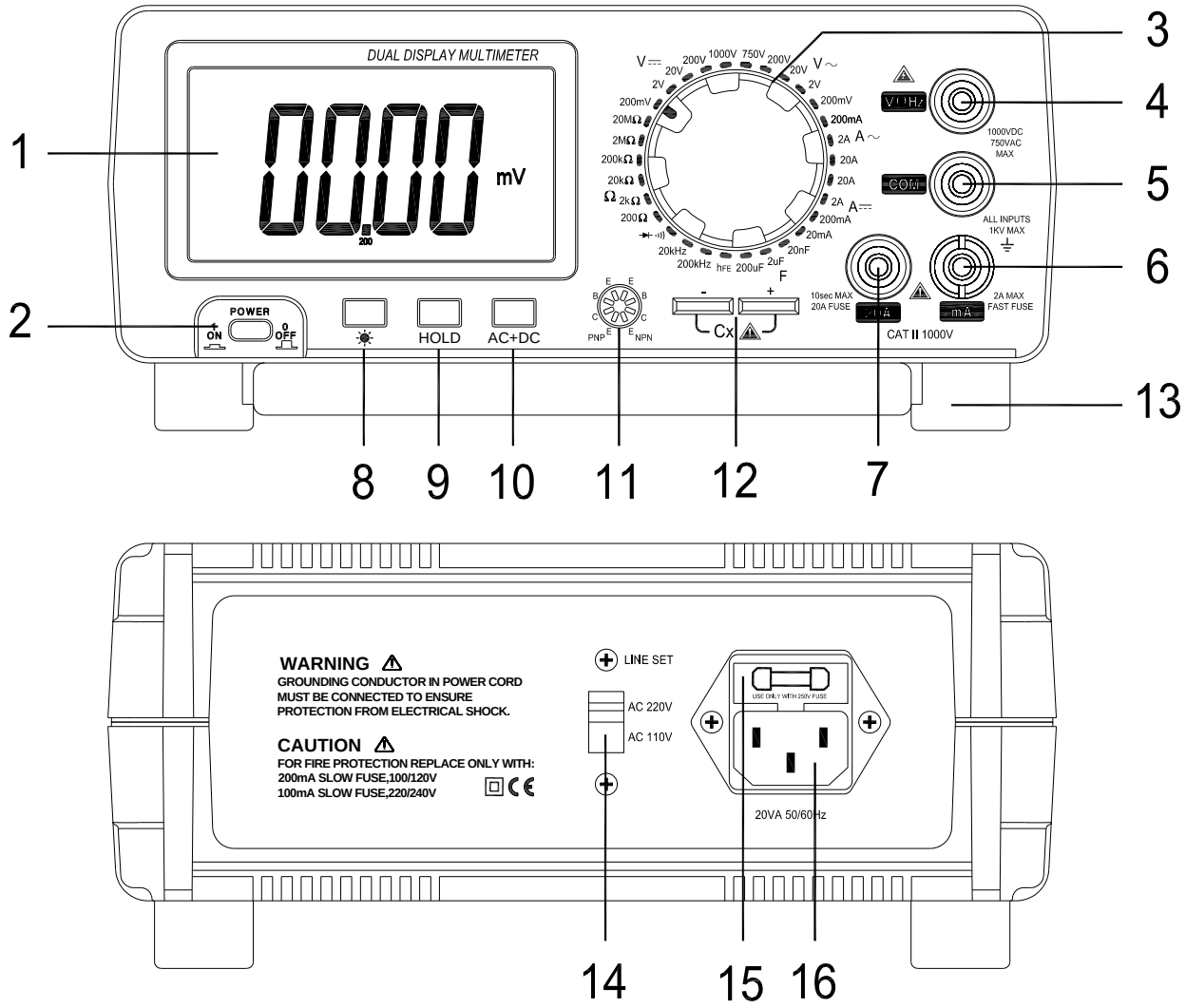
Diode and continuity test

Range	Description	Test condition
	The measuring value is the approx. value for forward voltage drop. When the resistance under tested is less than 30Ω±10Ω, buzzer sounds and display the approx. value. The open circuit voltage is approx. 3V.	Forward DCA is approx. 1mA, backward DCV is less than 3V.

Overload protection: 250V DC and AC peak value.

4. OPERATION

4-1. PANEL DESCRIPTION



1. LCD 2. Power switch 3. Function knob 4. V Ω Hz input terminal
5. COM 6. Current (<2A) input terminal and 2A fuse socket 7. 20A current input terminal
8. Backlight switch 9. Hold switch 10. AC+DC measuring switch 11. hFE plug
12. Capacitance measuring plug 13. Bracket
14. 110V/220V selector switch 15. Fuse 16. Power plug

The meter is driven by 220V or 110V AC voltage. The voltage is set on 220V when leave factory. If the local line voltage is 110V, please set the line voltage to 110V by the selector switch on rear panel.
When operating, first connect the power line to power plug, then turn on the power.
N**OTE:** Before connecting the circuit under measured, be sure that the measured value should not exceed the limit specified in front panel.

4-2 DCV measurement

Connect the black test lead to “COM” terminal and the red one to “VΩHz” terminal.
Set the function knob to V⎓ range, connect the test leads across to the circuit under measured, the polarity will be displayed with the voltage reading value.

NOTE:

- If the voltage under measured is unknown beforehand, start from the highest range and work down.
- If only MSD displays “1”, it means over range, should set to a higher range.
- Do not input a voltage over 1000V，otherwise, the circuit might be damaged.
- Be careful when measuring high voltage circuit.

4-3 ACV measurement

Connect the black test lead to “COM” terminal and the red one to “VΩHz” terminal.
Set the function knob to V～ range, connect the test leads across to the circuit under measured.

NOTE:

- If the voltage under measured is unknown beforehand, start from the highest range and work down.
- If only MSD displays “1”，it means over range, should set to a higher range.
- To get more accuracy, it’s better to select the range which the reading is more than 10% of full range.
- Do not input a voltage over 1000Vrms，otherwise, the circuit might be damaged.
- Be careful when measuring high voltage circuit.

4-4. DCA measurement

Connect the black test lead to “COM” terminal and the red one to "mA" terminal（max.2A）or “20A” terminal (max. 20A).
Set the function knob to A⎓ range, connect the test leads across to the circuit under measured, the polarity will be displayed with the voltage reading value.

NOTE:

- If the current under measure is unknown beforehand, start from the highest range and work down.
- If only the MSD displays“1”, it means over range, should set to a higher range.
- The max. input current is 2A or 20A (It decided by the COM of red test lead insert into), large current will blow the fuse. Be careful when measuring 20A range, running large current will make the circuit heat, even make the circuit damaged.

4-5. ACA measurement

Connect the black test lead to “COM” terminal and the red one to "mA" terminal（max. 2A）or “20A” terminal (max.20A).
Set the knob to A～ range, connect the test leads across to the circuit under measured.

NOTE:

- If the current under measure is unknown beforehand, start from the highest range and work down.
- If only the MSD displays"1", it means over range, should set to a higher range.
- To get more accuracy, it's better to select the range which the reading is more than 10% of full range.
- The max. input current is 2A or 20A (It decided by the COM of red test lead insert into), large current will blow the fuse. Be careful when measuring 20A range, running large current will make the circuit heat, even make the circuit damaged.

4-6. Resistance measurement

Connect the black one to "COM" terminal, the red test lead to VΩHz terminal.

Set the knob to Ω range; connect the test leads across to the resistance under measured.

NOTE:

- If the resistance is larger than the value of selected range, "1" displays. Set the function knob to a higher range. When the resistance is larger than 1MΩ, it will take a few seconds to be stable, it's normal in high resistance measuring.
- When the input terminal is in open circuit, OL displays.
- When measuring resistance in-line, be sure that power of the circuit under measured is turned off and all capacitors are released completely.
- If big error occurs, perhaps it effected by other elements in –line or there resist voltage on the ends of this resistance.
- Do not input voltage at the resistance range!

4-7. Capacitance measurement

Set the knob to "F"range. Insert the capacitor under tested to "Cx" terminal according to the polarity， and turn on the AC+DC measurement switch.

Connect test leads across to the two capacitors. It be careful the polarity.

NOTE:

- Set the knob to a higher range when the LCD only displays "1" if the capacitance under tested exceeds the max. value of selected ranges.
- When pressing AC+DC switch before testing, the LCD will not display "0", which resulted in the higher input value displaying. If AC+DC switch is at the state of jumping, LCD display the remnant data, which is normal, won't affect the test result.
- The LCD will not display stable data if it resists creep age badly or destroy the capacitance when measuring at the higher capacitance range.
- Release the capacitor completely to avoid damaging the meter before measuring.

4-8. h**FE**

Set the function knob to hFE range.

Be sure the transistor is NPN style or PNP style，insert the transmit polarity ,basic polarity, collector to the correct COM.

4.9. Diode and continuity test

Connect the black one to "COM" terminal and the red test lead to VΩHz terminal（note: the polarity of the red lead is +）.

Set the function knob to →|-·)) range, connect the test leads across to the diode (the red one connect anode polarity), the reading is the value of forward voltage drop.
When measuring diode, if making continuity test, buzzer sounds when the resistance between the test leads is less than approx. (30±10) Ω.

4-10.Frequency measurement

Connect the test leads or shielded cable to COM and VΩHz terminal.
Set the function knob to frequency range, connect test leads or cable across to the signal source or load under tested.

NOTE:

- In noisy environment, it is preferable to use shielded cable for measuring small signal.
- Be careful when measuring high voltage circuit.
- Do not input voltage over DC 250V or AC peak value voltage aviod to damaging the meter.

4-11.Data hold

Press the hold switch, the data will keep on LCD.

4-12. Backlight displaying

Press☀ switch, backlight will turn on, press it again, it will turn off.

5. MAINTENANCE

Do not verify the circuit to avoid damaging. Power fuse: 200mA/250V (located in input power socket); Fuse for measuring current: 2A/250V (located in the current input terminal), 13A/250V (located the main circuit). The fuse must be replaced by qualified personnel.

NOTE:

- Do not connect the voltage higher than DC1000V or AC 1000V rms.
- Do not measure voltage at the Ω range.
- When replacing fuse, please take away the test leads from the measuring point and power off at first.
- Keep the instrument away from water, dust and shock.
- Do not operate the meter in high temperature or strong magnetic place.
- Do not use the abrasives or solvents to clean the meter.

5-1. Fuse replacement

NOTE: Please select fuse of the same specification to replace it.

Power fuse: 200mA/250V (located in input power socket); Fuse for measuring current: 2A/250V (located in the current input terminal), 13A/250V (located the main circuit).
Power fuse replacement:

Pull out the power cord firstly, takes out the fuse jack on the top of power plug.

Take off the fuse, and replace an equivalent one then turn on the fuse jack.

2A fuse replacement

Press “mA” input jack by finger; take out the fuse jack after turning 90°angle by an inverse hour direction.

Take off the fuse, and replace an equivalent one then turn on the fuse jack.

After press the fuse into the fuse jack, turning 90°angle by an inverse hour direction.

13A fuse replacement (must be replaced by qualified personal.)

Screw off the four screws on the button shell by Phillips screwdriver, take off the upper shell.

Take off the fuse, and replace an equivalent one then turn on the fuse jack.

Take on the shell, .Screw on the four screws on the button shell by Phillips screwdriver.

6. TROUBLE SHOOTING

If the meter does not work properly, take actions as descriped in this manual to check out if the meter is defective or not.

Once defective or malfunctioning is confirmed, please contact your local distributor or the manufacturer for repairing.

The specifications are subject to change without notice.

The content of this manual is regarded as correct. If any error or omits is found, please contact with the manufacturer.

We hereby will not be responsible for the accident and damage caused by improper operation.

The function stated for this User Manual cannot be the reason of special usage.